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**THE STRUGGLE BETWEEN THE PRESENT AND THE FUTURE IN PROCRASTINATORS AND THE PUNCTUAL.
STRONG TEMPTATIONS IN THE PRESENT, OR WEAK INCENTIVES IN THE FUTURE?**

by
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The struggle between the present and the future in procrastinators and the punctual.
Strong temptations in the present, or weak incentives in the future?

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Abstract

Two studies investigated the role of impulsivity in procrastinators' problems. In the first study, 147 freshmen completed questionnaires measuring the big five personality factors, a broad impulsivity scale, and Lay's general procrastination scale, and their perceptions concerning a compulsory course. The data revealed that procrastination was closely related to a lack of perseverance, that is, the inability to complete projects. This relation explained a large part of the well-documented relation between conscientiousness and procrastination. In the second study, a subsample of these students was followed-up during 11 weeks before their exams. They had to provide their study intentions and behavior, the reasons why they failed to enact upon their intentions, and the perceived impact of studying on their final grade. The data revealed that all students tend to postpone the bulk of their study activities to the last week before an exam, and that this trend could nicely be described by a hyperbolic curve. The results also revealed that procrastinators postponed more of their intentions, mainly because of fun alternatives, but did not intend to study less or later. At the contrary, they even seemed to compensate for their vulnerability by formulating more intentions earlier. Procrastinators emerged as highly motivated students that lack the ability to ward off temptations and distractions during their studying activities.

Everybody procrastinates from time to time. However, some people tend to procrastinate habitually, regardless of the situation; they are called procrastinators, while people who do not have this habit may be designated as punctual. Procrastinators tend to score high on questionnaires measuring the personality trait procrastination (Lay, 1986), while punctual people tend to score low.

Procrastination is a behavioral tendency with potentially damaging consequences for the person suffering from it. Recently, much empirical research has been reported investigating some of its personality correlates (Johnson & Bloom, 1995; Lay, Kovacs, & Danto, 1998; Milgram & Tenne, 2000; Schouwenburg & Lay, 1995; Watson, 2001), its behavioral consequences (Dewitte & Lens, 2000a; Steel, Brothen, & Wambach, 2001), or both (Dewitte & Lens, 2000b; Lay, 1997; Lay & Brokenshire, 1997). The basic message seems to be that Conscientiousness, one of the Big Five factors of human personality (e.g. Costa & McCrae, 1992), explains the lion share of the variation in procrastination items, whatever measure is used for the latter.

However, much less is known about the underlying processes, of which the main stream can be characterised by the following sequence:

future examination → intention to study → actual study behavior → eventual passing
(distant goal) (intention) (behavior) (outcome)

What happens when a procrastinator postpones one of his or her intentions, and why is he or she more likely to do so than other people? From a practical point of view, knowing what happens in real time might be as relevant as understanding personality correlates of procrastination, because this will allow teachers to design situations that minimize the negative effects of (academic) procrastination. For instance, if procrastinators more than the punctual fail to become motivated by a remote future consequence (e.g., Dewitte & Lens, 2000a; Schouwenburg & Groenewoud, 2001), increasing test frequency might diminish the effects of discounting the future reward. This is indeed what Tuckman (1998) reported.

A recent study by Schouwenburg and Groenewoud (2001) tackled this question by letting students imagine how much time was left before the exams. They found that everyone would study less and would give in more to social temptations when the exams were remote than when they were near. That is, people discount the value of a future reward (i.e. passing the exam) with time, which is a general phenomenon that has

been reported in self-control literature (Ainslie, 1992; Bernheim, 1994; Logue, 1988; Ostaszewski, 1997; Rachlin, 1995). However, Schouwenburg and Groenewoud (2001) found, as they had expected, that procrastinators discounted the future reward to a larger extent than did very and moderately punctual students. Nevertheless, time-related increases in both study motivation and resistance to social temptation did not differ as a function of trait procrastination. This suggested that procrastinators do not have motivational deficits, and may not have more troubles resisting social temptations than others. Rather, the core of the problem might be situated in their problem to enact their behavior (see also Steel et al., 2001). The present paper attempts to add to the growing understanding of what drives (or fails to drive) procrastinators when they have to work towards a distant goal.

Two basic mechanisms might underly the relation between a lack of self-control (low success in goal attainment) and procrastination: A facilitatory versus an inhibitory failure (Carver & Scheier, 1999). First, procrastinators may have more troubles resisting temptations than do the punctual, for instance because of the need to relieve bad moods or feelings of dejection, which are more frequent in procrastinators (Lay, 1995). To cope with these negative affects, they may be more impulsive than their punctual counterparts. Second, procrastinators may have trouble appreciating the consequences that present choices have for the viability of remote goals. That is, they may underestimate the relevance of the present efforts (e.g. studying) for their final success (e.g. passing the exam) (Dewitte & Lens, 2000a). The first option would imply that procrastinators suffer from a lack of inhibition of competing activities, and the second one pictures procrastinators as suffering from a lack of facilitation of relevant (e.g. study) activities.

The two hypothesis have diverging implications, which will be tested using different methodologies. First, the two hypothesis have implications for the type of intermediate traits that may explain the relation between the higher order trait conscientiousness and the lower order trait procrastination. If procrastination is a matter of low inhibition, impulsivity due to a high sensitivity to temptations should mediate the relation between conscientiousness and trait procrastination. If, on the other hand, procrastination is a matter of low facilitation (or motivation), a lack of persistence should mediate the relation between both traits. Second, the two hypothesis have implications for the way intentions and their enactment evolve on a week to week basis during a semester for procrastinators and the punctual. If inhibition is the core problem in procrastination,

procrastinators should report having more trouble resisting temptations, and this failure should be the main reason why they postpone more of their intentions. On the other hand, if facilitation is the culprit in procrastination, procrastinators should underestimate the link between the present behavior and the distant goal more than do the punctual, and hence have fewer intentions. The two ways of testing these hypotheses called for different methodologies.

In the first part, taking place about 11 weeks before the final exams, students were assigned questionnaires measuring their score on the Big Five personality domains (Berkeley Personality Profile; Harary & Donahue (1994a&b), a broad Impulsivity test (UPPS, measuring four aspects of impulsivity: Urgency, Perseveration, Premeditation, and Sensation seeking, Whiteside & Lynam, 2001), a test for Trait procrastination (Lay, 1986; Schouwenburg, 1994), and questions concerning the expected impact of studying on their final grade for an important but unattractive course.

The second part involved an electronic measurement repeated weekly in a subsample of the first study. We measured study intentions for the coming week, study behavior during the past week, the expected impact on final grades of studying that week, and the reason why they failed to enact their intentions the past week (if they did at all). The reasons participants could choose among were the following: People could postpone their intentions because of fatigue (reflecting a possible lack of energy or 'inactivity', a facet of the Extraversion domain, Schouwenburg & Lay, 1995), because of engagement in more pleasant endeavours (Schouwenburg & Groenewoud, 2001), because of external (social) external pressure, or because of changes in study intentions (i.e., studying for a different course).

Although Schouwenburg and Groenewoud (2001) did not find evidence for a difference in impulsivity between procrastinators and the punctual, their findings relied on imaginative data. For instance, they asked students to imagine how they would react to situations such as these: 'A friend comes and asks you to join him for a party, although you have intended to study that night'. Participants had to imagine their behavior for different delays until the final exam at which this event happened. Possibly, estimating how one would react to an occuring temptation is driven more by one's intentions (e.g., no to give in) than by one's actual vulnerability. Indeed, one of the hallmarks of impulsivity (more specifically Urgency) is the engagement in behaviors *that one does not want to do,* for instance in order to soothe negative moods (Whiteside & Lynam, 2001). This implies that high scorers on this aspect of impulsivity do not

necessarily *know* that they will not be able to resist a temptation when it really presents itself, but nevertheless procrastinate on a task at hand while giving in to a temptation. In contrast, items gauging trait procrastination refer to actual procrastinatory behavior that has or has not occurred several times in the past. We believe that distortion is less severe in such cases. In sum, the hypothesis that (aspects of) impulsivity explains the link between conscientiousness and trait procrastination deserves a new test.

To that purpose, we conducted two studies. In the first study, we used the recently developed Impulsivity test of Whiteside and Lynam (UPPS, 2001). Starting from a broad battery of available impulsivity scales and some additional items that were lacking in extant literature, they constructed a questionnaire measuring all aspects of impulsivity that have been investigated in the past. Four distinct factors were extracted. The first factor was dubbed (lack of) Perseverance, defined as the tendency (not) to finish jobs when started. This factor is strongly related to Conscientiousness and all of its facets, except Deliberation. Note that the label Perseverance may sound rather negative; following Ryans (1939), Persistence might be preferable. Interestingly, a recent re-analysis of the firstly used self-report scale measuring Persistence showed Persistence te be a blend of four related constructs: Impulse control, Tenaciousness, Methodical work, all of them strongly related to Conscientiousness, and Autonomy, related to Neuroticism (Schouwenburg, 1998). Further, the (conceptual) relation between persistence and perserverance suggests that this factor reflects the (lack of) facilitation. Second, (lack of) Premeditation emerged as an important factor, reflecting the tendency (not) to think things over before getting into action. This scale is strongly related to the Deliberation facet of the Conscientiousness dimension. It is less clear whether this factor reflects facilitation or inhibition. Thinking about consequences might both be motivating or inhibiting. Third, a factor called Urgency emerged, reflecting the tendency to act on the spur of the moment in order to relieve negative moods. That is, this version of impulsivity (related to Neuroticism, especially the 'Impulsivity' facet) serves to relieve tension and negative affect. However, coping with negative affect in this way usually does not get the person out of trouble, because the long-term consequences of impulsive behaviors are often problematic themselves. The definition of this aspect does not leave not much doubt that it reflects a lack of inhibition. Finally, Sensation seeking (factor 4) reflects the tendency to strive for novel experiences and take risks.

We expected that procrastinators could be characterised by three of these four sub-types of Impulsivity. First, Urgency scores might be higher among them because one of the characteristics of procrastinators seems to be their worrying about their dilatory behavior (Milgram & Naaman, 1986; however, see Steel et al., 2001). This very worrying makes them feel bad more often than the punctual, which might trigger the urge to relieve tension and give in to temptations (e.g., Tice, Bratslavsky, & Baumeister, 2001). In contrast, procrastinators may lack Perseverance. The major support for this hypothesis is empirical. Because the Conscientiousness dimension is saturated with items related to Perserverance (Whiteside & Lynam, 2001), and because it is strongly related to Trait procrastination (e.g. Schouwenburg & Lay, 1995), it is likely that procrastinators will be low in Perseverance. However, if Trait procrastination reflects the failure to initiate activities that lead to one's goal, this does not imply that they do not finish what they started. On the other hand, if finishing what one starts reflects long-term projects (such as studying for an exam), it is obvious that failing to initiate short term activities (e.g., studying one particular chapter) damages overall project completion (e.g., mastering the whole course).

The third aspect of Impulsivity that we expected to be related to Trait procrastination was (lack of) Premeditation. Specifically, procrastinators may usually fail to think their activities over in terms of their consequences. Therefore, they may fail to appreciate that studying at this very moment increases their ultimate chances for success (Dewitte & Lens, 2000a), or conversely, that not studying at this very moment damages their chances for success. Finally, we did not expect that Sensation seeking would be related to trait procrastination in a systematic way, because seeking novel experiences may not only divert one from studying (a possible negative effect) but may also lead one to dig deeper into it (a possible positive effect). Still, we included the scale because Ferrari reported a positive relation between both constructs (1992).

The fairly simple hypotheses were that procrastinators would score higher on Urgency and lower on Premeditation and Perseverance. The more sophisticated hypotheses were that the relation between conscientiousness and procrastination would be mediated by these three constructs. Moreover, the hierarchy of this mediational analysis would suggest whether procrastination was a matter of lack of inhibition or facilitation. If Urgency would dominate the path between conscientiousness and procrastination, then the lack of inhibition hypothesis would be favored. If Perseverance would dominate that path, the lack of facilitation hypothesis would be favored. Further,

the weaker relation that has been found between Neuroticism and Trait procrastination (Johnson & Bloom, 1995; Schouwenburg & Lay, 1995; Steel et al., 2001) was expected to be mediated by Urgency.

In the second study, these hypotheses were tested by means of a different methodology. If procrastinators can be characterized by lower levels of inhibition, they are expected to postpone due to temptations (i.e. giving in to fun alternatives) more often than the punctual. For other reasons (fatigue, study schedules changes, and external reasons), no differences were expected between procrastinators and the punctual. If procrastinators lack facilitation, they should be less influenced by remote future events and rewards than others. In line with this, Dewitte and Lens (2000a) reported that procrastinators described their studying activities less often in terms of remote goals or, in other words, by means of high action identities (Vallacher & Wegner, 1987). High action identities are action descriptions that define the present activity in terms of its broader context, its guiding goals, or its (unintended but appreciated) consequences. Typical items that procrastinators endorsed to a lesser extent than the punctual were 'Studying is preparing for the exams', 'Studying is making sure that I pass', and so on. This lack of insight in one's future might be an important mechanism behind dilatory behavior. Specifically, procrastinators might fail to increase motivation related to required activities and hence fail to engage in them (Ainslie, 1992; Atkinson & Birch, 1986; Metcalfe & Mischel, 1999). Based on this hypothesis, we expected that the evolution of study behavior would parallel the evolution in expected impact of presently studying on the final outcome. That is, procrastinators might fail to see the relevance of presently studying and therefore postpone their intentions much longer than do the punctual.

Study 1

Method

Participants

Participants were 147 freshmen (130 women (88.4%), 17 men) enrolled in educational sciences at the University of Leuven (Belgium, Dutch speaking part). Their ages ranged from 17 to 42 ($M = 18.6$, $Sd = 2.1$). They received a battery of tests during one of their regular lectures. In addition to these test (described below), they had to

complete some additional items concerning an obligatory course they were taking (Introduction to Statistics, an important but rather aversive course that is needed for their training as an educational scientist). On the final page, they were also invited to participate in a follow-up study proceeding by means of a weekly e-mail until the final exams. The items (measuring some aspects of the course) they would receive on a weekly basis were presented to help them decide. Further, they were told that simply participating and expressing one's intentions may enhance study behavior. The condition for participation was that they had an e-mail address that they checked at least once a week. They were assured that they were allowed to quit the study at any time without any consequences. Volunteers simply had to identify by providing their e-mail address. Fifty-four complied with this request (36.7%). Completion took about 20 minutes.

Instruments

First, participants completed the (new) Dutch translation of the UPPS (Whiteside & Linam, 2001), consisting of 4 scales (45 items) measuring Urgency, Perseverance, Premeditation, and Sensation seeking. They then provided their gender and age. They completed the validated Dutch translation of Lay's general Procrastination scale (1986, 20 items, translated and validated by Schouwenburg, 1994). They also completed the validated short Dutch version of the Berkely Personality Profile (35 items, Harary & Donahue, 1994b) measuring the Big Five personality domains with seven items for each domain. Finally, several questions were presented concerning the course 'Introduction to Statistics'. Students had to provide the number of hours they intended to study next week and the number of hours they had actually studied during the past week. They then had to estimate how many points their grade would increase by studying 5 hours during the next week in comparison with no studying at all (= perceived impact of studying). They had to do so on a 12-point scale. In the system these students were enrolled in, grades range from 0 to 20. They pass if they obtained 10 points out of 20. They were presented with a scale from 0 to 2 additional points (with step 0.2) and one additional option > 2. Then they had to rate the importance of succeeding (on a 8 point scale from 0 to 7). Finally, they had to provide their aspiration level (expressed by the grade they strived for from 0 to 20).

Results

Instruments

Impulsivity. An initial factor analysis with 4 factors explained 42% of the variance in the 45 items measuring the four aspects of impulsivity. Subsequently, six items were deleted: Three items loaded on the wrong factor: 'My thinking is usually careful and purposeful' loaded on Perseverance rather than on Premeditation; 'I am not one of those people who blurt out things without thinking' loaded negatively on Urgency rather than on Premeditation; and 'I'll try anything once' loaded negatively on Premeditation rather than on Sensation seeking, which are all plausible discrepancies. Further, three items loaded very poorly on the intended factor: 'I don't like to start a project until I know exactly how to proceed' (Premeditation, .34), 'It is hard for me to resist acting on my feelings' (Urgency, .18); and 'I would enjoy fast driving' (Sensation seeking, .17). The deviation from the original pattern may be due to the translation process, to cultural differences, but also to the fact that the UPSS is a very recently constructed instrument. With the 39 items remaining, four factors explained 46% of the variance. The number of items and Cronbach's alphas are: Premeditation : 8 items, 0.79; Urgency : 11 items, 0.83; Sensation seeking: 10 items, 0.88; and Perseverance : 10 items, 0.84.[1]

Berkeley Personality Profile – Dutch version, and Procrastination. Given the widespread use of both questionnaires, only internal consistencies are provided. Lay's procrastination (Schouwenburg's 1994 Dutch translation) was internally consistent: α = 0.89. Concerning the Big Five, seven items measured, as intended, (negative) Neuroticism (α = 0.85). Extraversion (seven items) was also consistent (α = 0.85). Only five items of the Openness scale turned out consistently measuring that factor (α = 0.77). Items 10 ('[is a person who] prefers work that is routine and simple', .24) and 30 ('[…]is ingenious, a deep thinker', .37) loaded poorly on this factor and had slightly higher (and negative) loadings on Agreeableness. Conscientiousness was consistent (α = 0.73) if the item 8 ('[…] can be somewhat careless') was dropped, which loaded higher and negatively on Neuroticism. Finally, the fifth factor (Agreeableness) did not come out well. Only three items loaded acceptably high but internal consistency was poor (α = .55). The items 17 ('[…] likes to cooperate with others') and 27 ('[…] is generally trusting.') loaded very low on all factors and items 12 ('[…] can be cold and aloof') and 22 ('[…] is sometimes rude to others') had higher (negative) loading on Extraversion. Therefore, this factor will not be used in the remaining analysis. This is

not to dramatic to our purposes, because Agreeableness was irrelevant for the hypotheses to be tested.

Dispositional antecedents of procrastination

The initial model we submitted to a path analysis had three major parts: four personality factors on the left side (the Big Five minus Agreeableness), the four impulsivity scales as intermediate variables, and Trait procrastination as the criterion. The intercorrelations of all the variables included are presented in Table 1. Based on Whiteside and Lynam (2001) we included paths from Conscientiousness to Perseverance and Premeditation, from Extraversion to Sensation seeking, and from Neuroticism to Urgency. No paths left Openness. Based on Schouwenburg and Lay (1995), we included paths to Procrastination from Perseverance (given that the Conscientiousness factor is saturated with Perseverance items), from Urgency (see Tice et al., 2001), and from Premeditation. Further, because the relation between conscientiousness and procrastination could also be due to urgency, we included a path from Conscientiousness to Urgency. Finally, we had no reason to expect an influence from sensation seeking on procrastination. Initially, no direct path from conscientiousness to procrastination was included because we suspected that Premeditation and Perseverance would mediate that relation.

**********insert Table 1 about here**********

**********insert Figure 1 about here**********

The initial model fitted poorly (Adjusted Goodness of fit (AGFI) = 0.75; χ^2(Df= 17) = 78.5, $p < .0001$). Modification indices suggested three major changes: First, a direct path from Conscientiousness to Procrastination was still required (in addition to the indirect path through perseverance), suggesting that impulsivity in all its facets could not explain the entire relation between both variables. Second, additional paths were required from some general traits to some impulsivity variables. Specifically, Perseverance appeared also positively and Premeditation negatively influenced by Extraversion rather than by Conscientiousness alone. In addition to Premeditation and Conscientiousness, Perseverance seemed to influence Urgency to some extent. Finally, Openness affected Sensation seeking. The final adaptation that was required to our

original model was a more fine-grained structure within the impulsivity scales. Interestingly, Perseverance seemed to precede the others and uniquely influence Premeditation and Urgency (the latter negatively). In its turn, Premeditation negatively influenced Sensation seeking. The model with these paths reversed or with paths in both directions fitted more poorly than the proposed one. Figure 1 presents the final fitting model (AGFI = 0.94, χ^2 (DF = 15) = 12.34, p = 0.65). It deserves mentioning that we also explored the influence of all possible two-way interactions on Procrastination by means of a hierarchichal regression. None of these substantially contributed to Procrastination, while the main effects just mentioned were maintained.

Procrastination and course perception

Correlations between course perception variables and trait procrastination were not significant, with the exception of weak correlations with level of aspiration (r = -.17, p<.04) and with importance of succeeding (r = -.22, p<.01). Aspiration level was further related to Emotional Stability (r = .17, p<.04), and Perseverance (r = .26, p<.005). Importance of succeeding was further related to Conscientiousness (r = .20, p<.03), and to Perseverance (r = .18, p<.03).

Discussion

In this study, we tested the hypothesis that the relation between the higher order trait (or domain) Conscientiousness and the lower order Trait procrastination is mediated by aspects of impulsivity. Specifically, we had expected that Perseveration, Premeditation, and Urgency, three of the four aspects of impulsivity, would all uniquely contribute to the variance in Trait procrastination and explain the relation with Conscientiousness and, if any, with Neuroticism.

The correlations between these three (and not Sensation seeking) and procrastination are indeed significant. However, the results of the path analysis suggest that the relation between Premeditation and Urgency on the one hand and procrastination on the other is not a direct one. Rather, these relations depend on a common third variable. The weights of the paths suggest that this common sources of variability are Conscientiousness and to a lesser extent Perseverance. In contrast, Perseverance can

explain a substantial part (the weights suggest more than half) of the correlation between Conscientiousness and Procrastination.

This finding is far from trivial (e.g. due to item overlap), as the items measuring Perseverance are conceptually different from those measuring Trait procrastination. In agreement with Lay's (1986) definition of procrastination as a personality trait, the items in his scale reflect a problem that is situated in the enactment of one's intentions (see also Steel et al., 2001). The focus is on initiating behaviors that are required to reach one's goals. Indeed, Trait procrastination had a close to nill correlation with number of intended study hours (see also Dewitte & Lens, 2000a).

In contrast, Perseverance focusses on persisting on activities that lead to one's goals. Initiating behavior and persistence are different things. Conceptually, procrastinators might have been people who usually fail at beginning their tasks in time, but once started, finish them with zeal. According to this view, they would be people with a large degree of 'inertia': Starting is difficult but stopping is difficult too (Compare with a heavy train that you want to push: It is hard to move it, but when it is in motion, it is difficult to stop it). In contrast, people who have difficulties sticking to an activity in the face of temptations (i.e., low in Perseverance) may well be underperformers but not necessarily procrastinators. That is, they may initiate as many of their intentions as others, but fail at their completion. Now the present findings strongly suggest that procrastination is a problem that is mainly situated in the completion of projects, rather than in or in addition to the mere initiation of behaviors leading to one's goals. Using the same metaphor, procrastinators are like people with poor physical strength: they do not only have problems in getting the train in motion, but they also seem to have problems in keeping it rolling. This is reminiscent of Muraven and Baumeister's (2000) series of studies that self-control (of which procrastination reflects a lack) relies on an inner source of strength.

This interpretation also suggests that procrastination may reflect a lack of facilitation (of less attractive activities, such as studying Statistics) rather than a lack of inhibition (of temptations), which is consistent with Schouwenburg en Groenewoud's (2001) findings. That is, if inhibiting temptations would be the procrastinator's major problem, Urgency should have contributed stronger to procrastination than it does here. The correlation that we found between urgency and procrastination relies more on the relation between Urgency and Conscientiousness than on a direct causal effect. Similarly, the relation between thinking about the future consequences of one's behavior

(Premeditation) and trait procrastination was not direct, as we had hypothesized, but was also mainly mediated by variance in Conscientiousness and/or Perseverance items. We speculate that premeditation may be a result of being conscientious and zealous because working regularly increases the likelihood of success and hence the perception of a link between present effort and future consequences, rather than directly decreasing procrastination.

The purpose of the second study was to evaluate these findings by means of a different methodology with a focus on behavior rather than self-report measures. Self-reported procrastination and actual dilatory behavior are not perfectly related (e.g., Schouwenburg, 1994; Steel et al., 2001). Moreover, the data of the second part focus on the evolution of behavioral and perceptual measures across time rather than on a snapshot taken at an arbitrary moment during the semester. That the moment in the semester plays a role for state measures such as the expected impact was clearly demonstrated by Steel et al. (2001). They found that the intention-action gap is initially bigger for procrastinators than for the punctual but that this difference reverses in the week before the exam.

Study 2

The major aim of this study was an evaluation of the evolution across time of procrastination and study behavior during the semester (on a weekly basis). We expected that study efforts would intensify during the few weeks before the examinations, and that the size of this acceleration would be larger for procrastinators than for the punctual (thereby replicating Schouwenburg and Groenewoud, 2001, with recent retrospective rather than imaginative data). The authors cited did not find a similar difference between procrastinators and their counterparts in the evolution of neither general study motivation, nor resistence to (social) temptations. However, in the introduction we reasoned that people might have difficulties predicting their reactions to imagined temptations. The present method removed this problem by asking them not to predict but to report their resistence to temptations.

In addition, two crucial variables were measured on a weekly basis to evaluate their role in dilatory behavior in particular, and study behavior in general. The first variable was the impact students thought studying the coming week would have on their final

results. Second, we measured the reasons why they had failed to enact their intentions (if applicable). If procrastination is characterized by a higher vulnerability to temptations, postponement should be due to fun alternatives rather than to fatigue, external reasons, change of study plans, or other factors. If procrastinators lack facilitation, the larger discrepancy between their intentions and behavior should be due to a lower perceived impact of studying.

Method

Participants

Fifty-four participants volunteered to cooperate in the follow-up study by providing their e-mail addresses. Men were somewhat more likely to comply (9/17, 52.9%) than women (45/130, 34.6%). Of these 54 participants, 23 persisted until the end. Two of these students did not study the last week because of (self-declared) test anxiety. We provided them with the coordinates of the local student counseling service. So complete measures of 21 students were taken into account.

Further, we explored whether compliers differed on any relevant dimension from non-compliers. It should be kept in mind that compliance not only depended on participants' willingness to participate, but also on their having an e-mail that they checked regularly and possibly on the fact whether or not they believed the benefits they would enjoy from participating (see Method study 1). The grades the different groups of students obtained cannot be used to evaluate possible sample differences because of the confound between method and sample.

Four differences between both groups were significant and one marginally significant. In comparison with non-compliers, compliers had higher scores on Sensation seeking ($M = 2.79$ vs $M = 2.59$, $Sd = 0.6$; $F(1,145) = 4.02$, $p < .05$), (marginally) on Extraversion ($M = 3.62$ vs $M = 3.40$, $Sd = 0.7$; $F(1,145) = 3.62$, $p = .06$), on Openness ($M = 3.87$ vs. $M = 3.63$, $Sd = 0.7$; $F(1,145) = 4.30$, $p < .04$), lower scores on Premeditation ($M = 2.76$ vs $M = 2.92$, $Sd = 0.4$; $F(1,145) = 6.52$, $p < .02$). All other Fs were smaller than 1.0. In sum, the differences were small and the crucial variables (Procrastination and Conscientiousness) did not differ at all.

Of the 54 compliers, several students did not make it to the end. First, the remote e-mail server replied that two e-mail addresses did not work. In addition, ten students did not answer the first e-mail. In the first half of the series (first six weeks), 4 students announced that they wanted to stop, and another 5 stopped answering the e-mails,

leaving 33 participants after 6 weeks. Between week 6 and the final two weeks, another 10 students quit the experiment (most of them announced that they stopped). Finally, two were discarded from analyses because of test anxiety (see above).

Procedure

Participants received an e-mail every Monday (the same day as the first session). They were asked the number of hours they intended to study until (and including) next Monday for Statistics (question 1), and how many hours they had actually studied since last Monday (question 2). The lectures for this course had finished by the first session. Most participants answered within the first 24 hours, with an average delay of 20 hours over participants over measurements).

In the third question, they had to subtract the hours actually studied from the hours planned last week (which was rehearsed for them). If this difference was larger than zero, they had to assign these hours to one or more of the five following categories: (1) fatigue, (2) more fun alternatives (friends, sports, T.V., surfing, etc...), (3) external causes (visit, pressure of others, fire), (4) change in study plans (studying another course), and (5) other reasons, in which case they were asked to specify. Finally, they had to estimate the impact on their final grade of studying 5 hours the coming week in comparison with no studying at all (see method Study 1).

In the system the participating students were enrolled in, most exams are clustered in one month (June). The exam for Statistics took place eleven weeks after the first session. Thus, eleven measurements were taken (ten intentions, ten impacts, ten behaviors, ten intention-behavior differences, with intentions measured one week before the behaviors).

Results

Relations between trait measures and intentions, behaviors, and perceptions averaged over measurements

A measure for dilatory behavior was created by dividing the number of hours studied by the number of hours intended for every week and every participant (unless they had no intentions for that course the previous week), and substracted this from 1 (which denotes complete intention fulfillment). These were then averaged across measurements. For instance a value of 0.2 refers to the fact that a student actually enacted 80% of his or her study intentions and failed to do so for the remaining

intentions. Further, the number of hours postponed was categorized according to a reason they selected from the five categories mentioned above. Participants could choose between fatigue, fun alternatives, external reasons, and changes of study plans. The fifth category was diverse (e.g., illness, test anxiety, finished earlier than anticipated, etc.) and was discarded from analyses.

**********insert Table 2 about here**********

Table 2 shows the intercorrelations between the trait measures (collected in study 1) and the averaged repeated measures. The expectations were that procrastination would be positively related to dilatory behavior and to the relative frequency of postponement due to fun alternatives (but not other reasons) and negatively to low perceived impact of studying, No relation was expected with number of intended study hours. A similar pattern of relations was expected with Urgency, and opposite patterns were expected for Conscientiousness, for Perserverance, and for Premediation. Note that the statistical power of these tests is quite low due to the small sample sizes.

Contrary to expectations, students relatively high in Trait procrastination intended to study *more* hours and also, although not significantly, did study more hours than students relatively low in this trait. Dilatory behavior, defined as intentention-behavior discrepancy, was not related to procrastination nor to lack of conscientiousness nor to any of the impulsivity subscales. Thus, at least in studying Statistics, trait procrastination does not result in dilatory behavior, but in increased effort in this sample.

However, focusing on a specific form of dilatory behavior (postponement because of fun alternatives), changed the picture. The relation with procrastination was high and reliable, whereas that with urgency was smaller and not significant. It seems, then, that procrastination is related to the failure to ward off temptations, and less to other varieties of dilatory behavior.

Further, no reliable relations with impact of studying (averaged over measurements) were found, except (unexpectedly) with sensation seeking and, to a lesser and not significant extent, with Emotional stability. Sensation seeking apparently increased perceived impact of studying. To our surprise, number of intended study hours tended to be positively related to procrastination and negatively to Perseverance. Finally,

postponing study intentions because of fatigue seemed positively related to neuroticism (and not to extraversion, although this domain incorporates the facet 'activity').

Hyperbolic discounting of study intentions and behavior: group data

The ten measurements of the intended and studied hours were averaged over participants (yielding two series of ten measurements). The delay was converted to days, and the number of hours intended and studied was divided by seven (i.e. hours a day). The maximum hours studied was set at 40 hours a week (which was derived from the observed maximum number of hours intended). In order to find the best fitting hyperbolic curve (and corresponding *k* - see Schouwenburg & Groenewoud, 2001) the sum of squared discrepancies between observed and predicted values (over the ten measurements) was minimized. For comparison, the best fitting linear trend was computed.

**********insert Figure 2 about here*********

Figure 2 shows the best fitting hyperbolic curves, linear trends, and the observed trends for number of intended hours. With respect to intentions, the hyperbolic curve explained 89.2% of the variance in the data, with a *k* of 0.44. (Larger ks reflect steeper curves). The best fitting linear trend explained only 47.6% of the variance in the data. It can be observed that intentions in week 2 and 3 are somewhat lower than predicted. This is probably due to other examinations in that period. The substantial low in week 9 for is a result of the clustering of the examinations (see above). Three weeks before the series of exams begins, all lectures cease, which allows students to prepare for the exams. Because the series of exams is the same for all students, the ninth week is typically reserved for preparing exams that follow later in the series, which explains the low in the study intentions during that week. In spite of this specific characteristics of the examination system the present students were involved in, the hyperbolic curves still fit reasonably well.

For number of hours studied, the curve is highly similar to that presented in Figure 2 (see correlations between intentions and behavior, Table 4). Here, the fit is 91.9% (linear trend: 49.1%), with a *k* of .46.

Hyperbolic discounting of study intentions and behavior: individual data

Two k-values were calculated for each individual: One for study intentions and one for actual study behavior with the same estimation technique. The correlations between these k-values and the traits were calculated. It was expected that procrastination, lack of conscientiousness, and lack of perseverance would be positively related to the *k*s of study behavior, but not that of intentions. Table 3 shows the correlations between the two *k*s and the three variables just mentioned and premeditation. Unexpectedly, the trend was opposite to the trend predicted: Conscientiousness, lack of Procrastination, Perseverance, and Premeditation were all related to larger *k*s (i.e., steeper curves, referring to later studying).

*********Insert Table 3 about here**********

The last column of Table 3 shows the correlations between the ks and the corresponding behavior. These correlations shows that k is highly determined by the number of hours intended or studied: the more one studied or intended to study during the entire time interval, the lower was the *k* for studying.

To rule out that technical features of the estimation procedure might have yielded artificial results, the individuals' curves were inspected. Figure 3 presents the highest and lowest scorers on procrastination. The high scorer (average of 4.40 on a 5-point scale) had the second lowest *k*-value (0.28) of the sample, and studied much more and earlier than the low scorer (average of 2.20), who had the highest *k*-value of the sample (1.17). Given that intentions largely determine behaviors in the present sample (see below, Table 4), and that procrastinators are more likely to postpone their intentions (see Table 2), this seems to suggest that procrastinators tend to compensate their tendency by intending to study more and earlier. Apparently, the compensation in intentions outweighed the postponements in the present sample, yielding a negative relation between procrastination and *k*-values for studying behavior.

*********Insert Figure 3 about here**********

Relations between intentions, behaviors, and perceptions across the measurement period over individuals

Earlier, we reported that perceived impact of studying averaged over measurements was not related to relevant traits (except Sensation seeking), study behavior, or dilatory behavior over individuals. Now we will explore whether there is a relation between impact and other weekly measured variables over individuals. Table 4 shows the interrelations between intentions, perceived impact, behavior (with a lag of one week), dilatory behavior (behavior divided by intentions averaged over participants, lag of one week substracted from 1), and the major source of postponing: (vulnerability to) fun alternatives (divided by intentions averaged over participants). To rule out the possibility that impact and intention are correlated merely because they are related with delay, the number of the week (i.e. the delay to the exams) was controlled for. The partial correlation is presented as the second correlation in the relevant cell in Table 4.

*********Insert Table 4 about here**********

The data indicate that study intentions determine study behavior almost perfectly (measured one week later) in the present sample. Dilatory behavior is not related to any of the other variables, but is highly related to fun alternatives. Further, perceived impact is strongly related to intentions. This is surprising because the variability in perceived impact is quite low in comparison with that of number of intended study hours. Table 5 shows the evolution of the perceived impact of studying and number of intended hours over the 10 week period. The bottom line shows the correlation between number of week and the two measures.

*********Insert Table 5 about here**********

Discussion

First, the data show that study intentions and behavior follow an evolution across time that can be characterized as a hyperbolic function: low study activity in the beginning that is continued for a long time, and a steep increase close to the exams. Schouwenburg and Groenewoud (2001) already noted that this general 'cramming' trend is normal: most people behave that way, irrespective of their trait procrastination. This

is in line with Logue's (1988) account of self-control: people are able to look in the future, but the influence of the future is relavitely limited. One could argue that this is functional. Studying intensively ten weeks before the exam might be lost effort, not only because of highly unlikely events that might intervene and prevent the efforts from yielding the anticipated rewards (see Logue, 1988), but perhaps mostly because of forgetting. Indeed, students seem to appreciate that the impact of their efforts increases when the delay to the exams decreases, although the absolute difference is smaller than what could be expected intuitively (i.e., the increase is very modest in comparison with the increase in intentions, see Table 5).

Nevertheless, the correlation between perceived impact and number of intended hours is quite substantive. The present data do not allow firm causal inferences, but delay until the exams might be considered to determine both. However, this relationship remains high when number of the week is partialled out. This suggests that delay per se does not determine both intentions and perceived impact separately, but that one determines the other. Further research is called for to explore whether perceived impact determines intentions or vice versa.

Schouwenburg and Groenewoud (2001) found that the *k*-value (i.e. degree of acceleration of studying) is related to procrastination. They reported that procrastinators had higher *k*-values than the punctual. Specificallly, the delay at which they imagined beginning to study fell closer to the exam for procrastinators than for others. In the present study, we were not able to replicate that finding. As Figure 3 shows, procrastinators did neither intend to study less nor actually studied fewer hours than others, nor did they exclusively cram at the last moment, at the contrary. Still, procrastination was related to dilatory behaviour, at least to postponing behavior due to fun alternatives.

How could these diverging findings be reconciled? It seems as if procrastinators (i.e., people who postpone a larger proportion of their intentions than others) are aware that they are more vulnerable to lurking temptations and therefore try to compensate for this weakness by formulating more intentions. This compensation may be preventive, curative, or both. The curative interpretation might explain why procrastinators had higher *k*-values in the study by Schouwenburg and Groenewoud (2001) who used imaginative data, whereas in the present study they did not. Specifically, one cannot cure what has not happened. However, the curative interpretation would also imply a correlation between intentions and postponements the week before (in general or due to

fun alternatives), but no evidence was found for this correlation in the present study. However, the number of observations is extremely small ($n = 8$) and the lack of correlation might be unreliable.

In addition, vulnerability to temptations may be more subtle than what our measures could convey. Possibly procrastinators have problems concentrating *during* their study activities (Dewitte & Lens, 2000b), although they may sit in front of their books and be studying objectively. Consistent with this interpretation is the finding that people high on perseverance (which is highly negatively correlated with procrastination, see Study 1) formulated fewer intentions, possibly because they were confident that when they studied, they would do so efficiently. The punctual indeed tended (but not significantly so) to perceive the impact of studying five hours higher than procrastinators. This rather supports the preventive interpretation: Procrastinators intend more because they know that their studying is not so efficient.

In sum, procrastinators reveal themselves here as highly motivated students. However, they suffer from a serious problem: While studying, they are vulnerable to temptations. We found that they indeed have more troubles acting upon their intentions, and that this is mainly due to their indulgence in more fun activities. However, our data suggest that this does not necessarily lead them to complete failure. They seem to compensate this weakness by increasing their good intentions. They may do so not only because they expect that unanticipated temptations will pull them from their books, but also because they may have troubles concentrating in general. In other words, one hour of study may not be the same for them as for punctual students.

General discussion

The major aim of this study was to increase our understanding of procrastination. We wanted to explore whether it was related to impulsivity, as claimed by self-control literature. We tackled this question with two different methodologies. We first explored whether trait procrastination was related to various aspects of impulsivity, which might explain the relation between consienctiousness and procrastination, and then proceeded with investigating its relation with study behavior and perceptions and how these variables evolved during the semester.

The present study provides multiple evidence that trait procrastination is related to impulsivity. First, lack of perseverance or the difficulty a person experiences maintaining goal-driven behavior explained a large part of the variance in procrastination items. Still, a portion of variance in trait procrastination remained directly related to an aspect of conscientiousness that was not captured by impulsivity scales. It is difficult to speculate on this, because many documented correlates of procrastination seem to be captured by one or more of the impulsivity scales. For instance, negative affect and its ensuing urge to relieve bad moods (Tice et al., 2000) would be captured by Urgency. Perceiving long-term goals and the resulting increase in motivation (e.g. Dewitte & Lens, 2000a; Metcalfe & Mischel, 1999) would be captured by Premeditation. Two other candidate correlates are lack of perfectionism and rebelliousness (Lay, 1986; Lay 1990) which might be related to both lack of conscientiousness and procrastination, but not to the impulsiveness scales. Nevertheless, one could argue that Premeditation might be related to both constructs and hence also explain that relation. More research is needed to settle that issue. Moreover, 39% of the variance in procrastination items remained unexplained at all (note that this is in an overestimation because it includes scale unreliability). Further, the expected bivariate correlations between Urgency and Premeditation on the one hand and procrastination on the other seemed to rely entirely on the mutual relations with Conscientiousness and/or Perseverance.

In sum, procrastination and impulsivity (especially lack of perseverance) are closely intertwined and their relation partially explains the relation between procrastination and conscientiousness. However, the remaining common variance in conscientiousness and procrastination remains obscure, as does the remaining variance in trait procrastination. Taken together, the first study suggests that procrastination is related to a lack of facilitation, because perseverance was the only aspect of impulsivity to uniquely determine procrastination.

In the second study, procrastination also turned out to be related to higher impulsivity. Specifically, procrastination was only slightly related to a larger behavior-intention gap (which it should according to the Lay's 1986 definition, see also Steel et al., 2001) but it turned out that the major source of delay was vulnerability to fun alternatives (rather than to fatigue, external reasons, or changing study plans). Procrastinators mentioned much more frequently that they did not succeed in attaining their planned number of hours because of fun alternatives than did more punctual

students. Further, procrastination was not related to a higher perceived impact of studying. Therefore, the second study suggests that procrastionation reflects a lack of inhibition rather than a lack of facilitation.

At first sight, then, both studies lead to conflicting conclusions. How similar are those two patterns of findings? Conceptually, a distinction could be made between lack of facilitation of less attractive activities (captured by lack of perseverance) vs. a lack of inhibition of fun alternatives. At first sight, perseverance refers to the first option, whereas indulgence to temptation refers to the second option. From this perspective, the first study supports the lack of facilitation interpretation, whereas the second study supports the lack of inhibition option. However, the second study revealed that lack of perseverance strongly determined vulnerability to fun alternatives, even more than did urgency (see Table 2). This suggests that either perseverance reflects a lack of inhibition rather than a lack of facilitation or that lack of inhibition and lack of facilitation are not so divergent as we first thought they were (e.g., Whiteside & Lynam, 2001). Because of the well documented difference between both drives in human behavior (e.g. Gray, 1987, see also below), we favor the the first option: maybe low perseverance reflects a lack of concentration relying on a lack of inhibition, rather than a lack of facilitation (we also refer to the significant negative correlation between urgency and perseverance, see Table 1). Our tentative conclusion then is that procrastinators are people who are vulnerable to distractions in general but do not have problems in facilitating their behavior. From this perspective, the poorer relation between procrastination and urgency in the first study suggests that relieving negative moods by behaving impulsively (i.e. urgency) is less typical of procrastinators than weakness in warding off more mundane temptations while working (Perseverance). The divergence with Schouwenburg and Groenewoud (2001) might then be related to people's inability to predict their reactions to unanticipated temptations.

How do procrastinators deal with this vulnerability to fun alternatives? The present study (study 2) provides a new perspective on the problem. Our data suggest that procrastinators try to compensate for their vulnerability by setting more intentions to themselves. This difference was not evident in the beginning of the semester, but procrastinators seemed to get ahead of more punctual students in formulating intentions. This provides additional evidence that procrastination does not reflect a lack of facilitation. It seems that this strategy is quite effective in enhancing their study efforts

(expressed in hours studied and in the k-parameter) , in spite of their larger vulnerability to temptations.

Some additional findings probably deserve comment. First, we did not find evidence that perceived impact of studying affected dilatory behavior. In the first place, this is an additional indication that procrastination does not reflect a lack of facilitation. Still, perceived impact showed a substantial (and unanticipated) relation with number of intentions formulated (and hence with study behavior during the following week). This suggests that awareness of future incentives helps people to engage in the required activities. It should be noted that it is also possible that a large impact is a post-hoc attribution of more intended effort. Moreover, the relation between perceived impact and intentions was only revealed when we considered intraindividual rather than interindividual differences. This may have to do with the relative difficulty of the item tapping perceived impact. People may not have been able to estimate the impact of their efforts in terms of additional grades accurately, but they may have developed their personal standard. Therefore, intraindividual fluctuations may reflect relative time differences rather than objective differences. Future research might benefit from simpler items that tap the impact construct, which would allow to evaluate interindividual differences. Specifically, if one succeeds in increasing perceived impact, this may lead to more intentions, more studying behavior, and possibly to better results (provided of course that perceived impact causes intentions and not vice versa).

This study suffers from several limitations. First, the sample size of the second study is not only too small to draw firm conclusions. In addition, it is highly self-selected. Although the trait measures did not reveal important differences as a function of sample, replications are badly needed to confirm the present findings. Moreover, to enhance the reliability of the time series correlations and the *k*-parameters, more and more fine-grained measures (for instance once every three days) may be needed in the future. For instance, the method did not allow to deal with the behaviors during the last week before the exams. Possibly, the largest differences between procrastinators and the punctual occur during that period (e.g. Steel et al., 2001) . However, the present study provides a first step toward (easily applied) dynamic rather than static data collection methods in this area. We strongly believe that this method may reveal a lot of

interesting information that remains obscure when only static measures are taken, but still is not as practically prohibitive as for instance event sampling methods.

Further, the conclusions may be limited by the fact that the sample consisted largely of female freshmen of one particular department, that the measurements were limited to one course, and that the education system (especially its clustering of exams) is not representative for the educational systems that are common worldwide. For instance, it is conceivable that many perceptions that were measured in the first study strongly fluctuate during the first year of experience with academic world. Procrastination scores may change as a result of self-perceived behaviors during the first year of the academic carrier.

Conclusion

Procrastinators are people who fail at completing their projects. They are not less motivated, on the contrary, but they seem extremely vulnerable to the pleasures of life. They may compensate this weakness by formulating more intentions. Nevertheless, it seems that their study efforts are not efficient, presumably because they have problems warding off small distractions in their studying environment that keep them from concentrating optimally on the material they want to master.

The lesson seems to be that procrastinators will not benefit from interventions that make them study more and enhance their good will but that they need to protect themselves against distractions in the broadest sense of the word. To conclude, the future is not too remote to motivate procrastinators. Rather, the present may be to attractive (or distractive) to make them finally reach their future goal.

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Table 1. The intercorrelations (decimals omitted) of the input, intermediate, and criterion variables of the proposed linear model (Study 1)

	Domains			Aspects of Impulsivity				
	2	3	4	5	6	7	8	9
1. Extraversion	24*	05	21*	-25*	06	**38**	17*	-11
2. Neuroticism-		07	18*	-02	**-37**	20*	14	-10
3. Conscientiousness			-05	**38**	**-46**	-11	**64**	**-69**
4. Openness				-06	-04	26*	00	-06
5. Premeditation				*.24*	**-39**	**-32**	**32**	**-38**
6. Urgency					*.38*	10	**-38**	**39**
7. Sensation seeking						*.23*	02	08
8. Perseverance							*.43*	**-72**
9. Procrastination								*.61*

Notes. n = 147

Boldface: $p < .0001$, * $p < .05$

In italics on the diagonal is the explained variance in the fitting path-model (Figure 1)

Table 2. Correlations between trait measures and average study intentions and behaviors, dilatory behavior, perceived impact of studying (Study 2).

	Cons.[1]	Extr.	Neur.-	Openn	Pers.	Prem.	Urg.	Sens.	Proc
Intended study hours	-.22	.32	-.27	-.20	-.52*	.07	.13	-.17	.50*
Hours studied	-.24	.15	-.09	.12	-.47*	.08	-.02	.07	.35
Dilatory behavior	-.04	.04	-.13	-.21	-.11	-.02	.21	-.26	.12
Due to Fatigue	-.32	-.09	**-.56**	-.10	-.31	.23	.29	-.36°	.39°
Fun alternatives	-.18	.11	-.06	-.32	-.31	.27	.39°	-.12	**.57**
External reasons	.07	.09	-.15	.02	-.25	.15	-.21	.03	.01
Change in plans	-.15	-.41°	-.11	-.15	-.28	.06	.05	-.33	.24
Impact of studying	.30	.25	.38°	.28	.30	.34	.08	.53*	-.12

Notes.

Boldface: $p < .01$; * $p < .05$; ° $p < .10$.

[1]. Cons.: Conscientiousness; Extr.: Extraversion; Neur.-: Neuroticism (reversed); Openn.: Opennes; Pers.: Perseverance; Prem.: Premeditation; Urg.: Urgency; Sens.: Sensation; Proc.: Procrastination.

Table 3. Correlations between the individual *k*-parameters for intentions and studying and conscientiousness, perseverance, premeditation, and procrastination. (n = 21) (Study 2)

	Conscientious.	Persever.	Premedit.	Procrastination	Hours
k- parameter					
k for intentions Statistics	.28	.34	.31	-.35	-.81***
k for studying Statistics	.41*	.44**	.40*	-.34	-.77***

Notes. * $p < .08$; ** $p < .05$; *** $p < .0001$.

Table 4. Correlations between intentions, behavior, and perceptions over time measurements (n = 10) (Study 2).

	lag	1	2	3	4
1. Hours intended	0				
2. Hours studied	1	**.997**			
3. Dilatory behavior	1	-.14	-.20		
4. Dil. Beh. due to fun alternatives	1	-.05	-.09	**.83**	
5. Perceived impact of studying	0	**.84** / .73°	**.87**	.33	-.10

Notes. Bold: $p < .01$; ° second correlation: number of week partialled out.

Table 5. Evolution of intentions and perceived impact of studying five hours a week over the ten week time interval.

	Perceived impact (points on 20)	Intentions (hours a day)
week 1	0.83	0.32
week 2	0.70	0
week 3	0.82	0
week 4	0.72	2.24
week 5	0.83	3.09
week 6	0.75	5.77
week 7	0.80	6.64
week 8	0.80	7.57
week 9	0.88	2.24
week 10	1.10	30.18
correlation with time	.62 (p=.066)	.69 (p=.03)

Figure 1.

The antecedents of Procrastination: the fitting linear equation model (Study 1).

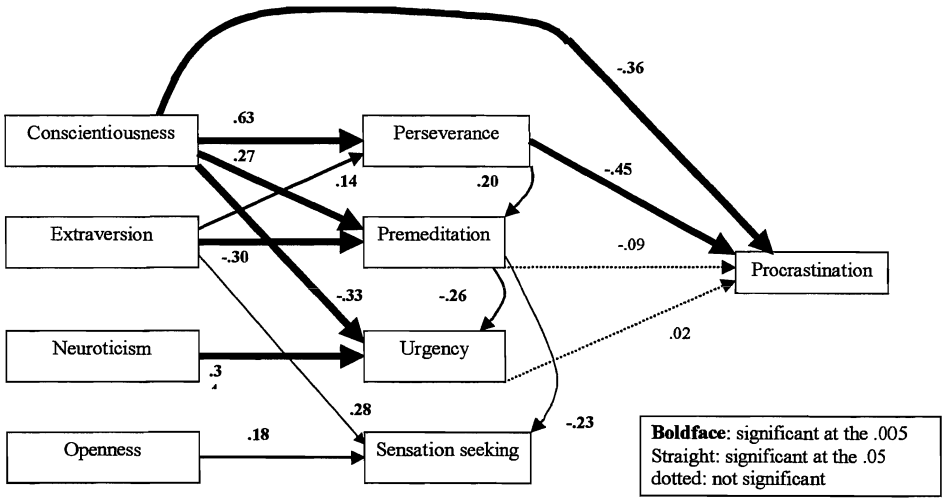


Figure 2.

The evolution of study intentions over a ten week time interval for Statistics and the best fitting hyperbolic and linear curves (Study 2).

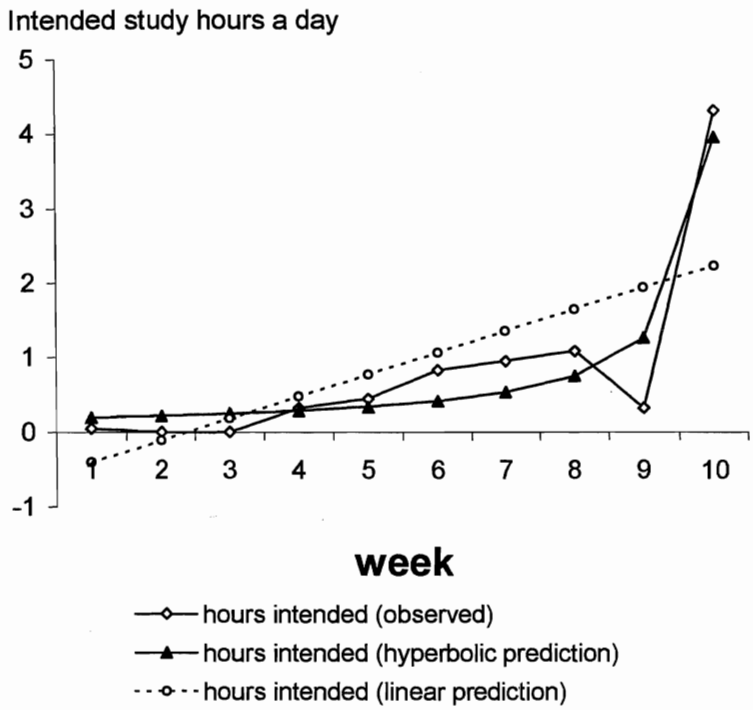
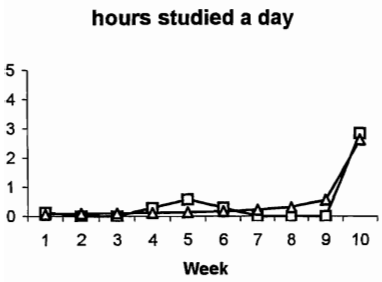
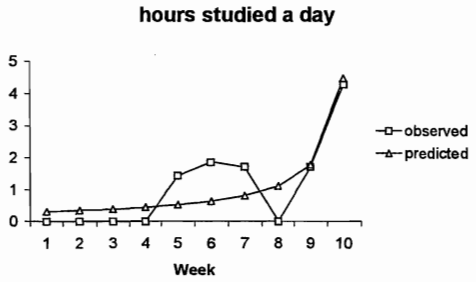


Figure 3.

The evolution of study behaviors for Statistics for two extreme individuals on the procrastination dimension over a ten week time interval (Study 2).



low procrastination,
high k (1.17),
fit: 89.2%



high procrastination,
low k (0.28)
fit: 71.8%

Notes

1. Our Dutch translation of the UPSS-scale and the factor loadings in our sample can be requested from both authors.